

WHAT IS CLAIMED IS:

2           1.     A material comprising at least two nanoparticles dispersed in a polymer matrix.

1           2.     The material as recited in claim 1, wherein the nanoparticles are silicon  
2 nanoparticles.

1           3.     The material as recited in claim 1, wherein the polymer matrix prevents the at  
2 least two nanoparticles from aggregating.

1           4.     The material as recited in claim 2, wherein the polymer matrix prevents the at  
2 least two nanoparticles from aggregating.

1           5.     A method comprising the steps of:  
2           adding a nanoparticles solution to a polystyrene and chloroform solvent;  
3           casting the combined solutions on a substrate;  
4           evaporating the solvent leaving a film of polystyrene formed with the nanoparticles  
5 embedded therein.

1           6.     The method as recited in claim 5, wherein the nanoparticles are silicon  
2 nanoparticles.

1           7.     The method as recited in claim 5, wherein the nanoparticles are dispersed in the  
2 film in a non-aggregated manner.

1           8.     A display apparatus comprising:

2                 a pixel element comprising a phosphor of at least two silicon nanoparticles dispersed in a  
3     polymer matrix.

1           9.     The display apparatus as recited in claim 8, wherein the at least two silicon  
2     nanoparticles are dispersed in the polymer matrix in a non-aggregated manner.

1           10.    The display apparatus as recited in claim 9, wherein the pixel element further  
2     comprises first and second subpixel elements, wherein the first subpixel element comprises  
3     silicon nanoparticles of a first diameter size selected to emit light of a first wavelength, and  
4     wherein the second subpixel element comprises silicon nanoparticles of a second diameter size  
5     selected to emit light of a second wavelength different than the first wavelength.

1           11.    The display apparatus as recited in claim 10, further comprising:

2                 a cavity containing a gas that emits ultraviolet light when energized by an electric field,  
3     the ultraviolet light bombarding the pixel element to cause emission of visible light from the  
4     silicon nanoparticles.

1           12.    A photovoltaic cell comprising:

2           an anode;

3           a cathode;

4           a conducting polymer layer adjacent the anode; and

5           a polymer/silicon nanoparticles layer comprising silicon nanoparticles dispersed within a  
6 polymer matrix, the polymer/silicon nanoparticles layer adjacent the cathode and the conducting  
7 polymer layer.

1           13.    The photovoltaic cell as recited in claim 12, wherein the conducting polymer  
2 layer comprises a conjugated polymer.

1           14.    The photovoltaic cell as recited in claim 12, further comprising a storage cell  
2 coupled to the anode and the cathode.

1           15.    A photovoltaic cell comprising:

2           an anode;

3           a cathode;

4           a first polymer/silicon nanoparticles layer adjacent the anode and having a first optical  
5 absorption edge; and

6           a second polymer/silicon nanoparticles layer adjacent the cathode and having a second  
7 optical absorption edge different than the first optical absorption edge.

1           16.    The photovoltaic cell as recited in claim 15, wherein the first and second  
2 polymer/silicon nanoparticles layers absorb light at different wavelengths.